

Use of Sun-Protective Items by Japanese Pedestrians

A Cross-sectional Observational Study

William Ng, MBBS, PhD; Shigaku Ikeda, MD, PhD

Objective: To document the prevalence and characteristics of the use of sun-protective items by Japanese pedestrians during the midday hours of summer weekends.

Design: Cross-sectional study.

Setting: Observations were undertaken at 5 locales in central Tokyo on weekends between 11 AM and 2 PM from August 7 through 22, 2010.

Participants: A total of 2338 Japanese pedestrians, from adolescents to senior citizens, were included in the study. Those wearing uniforms and formal attire and individuals of non-Japanese ethnicity were excluded.

Main Outcome Measures: The study examined the prevalence of the use of sun-protective items by pedestrians, including hats, parasols, sunglasses, and gloves/protective sleeves, and its association with demographic factors.

Results: Japanese female pedestrians demonstrated greater use of 1 or more sun-protective items compared with their male counterparts (53.0% vs 30.2%, $P < .001$), with parasols being the most popular item (33.0%). The wearing of sunglasses by pedestrians was low overall (males, 8.5%; females, 6.5%), despite the high UV indices recorded during the observation period. A significant proportion of adolescents and young adults (males, 77.1%; females, 65.1%) did not use any sun-protective items.

Conclusions: The promotion of sun-safety measures, including the use of sun-protective items among Japanese adolescents and young adults, may be warranted. The low use of sunglasses by Japanese pedestrians suggests a need to raise public awareness of UV-related ocular damage.

Arch Dermatol. 2011;147(10):1167-1170

EXCESSIVE EXPOSURE TO ambient UV radiation is a major risk factor for malignant melanoma and non-melanoma skin cancers. The amount of individual UV radiation exposure is influenced by the level of ambient UV radiation as well as by lifestyle, cultural attitudes, and personal habits regarding sun exposure and sun protection.¹ Observational and questionnaire-based studies assessing sun-protective measures taken by individuals during summertime²⁻⁴ and in high-risk settings for UV exposure (namely, the beach,⁵⁻⁷ schools,^{8,9} and recreational venues^{10,11}) have yielded important information regarding the effectiveness of public health campaigns and highlighted deficiencies in community awareness of sun protection that require further promotion.¹²⁻¹⁴ Most of these studies were conducted in Western countries, with limited information available regarding the sun-protective practices of individuals in Asian countries. Although the incidence of skin cancer is lower in in-

dividuals of Asian ethnicity than in the white population, those of Asian ethnicity remain susceptible to the detrimental effects of UV radiation, including cataracts and photoaging. Epidemiologic data suggest that the incidence of melanoma and nonmelanoma skin cancer has risen in Singapore¹⁵ and in Japan.¹⁶ As such, the aim of this study was to monitor the use of sun-protective items in a representative sample of Japanese pedestrians in a major urban center during the midday hours in summer.

METHODS

The study was conducted during the Northern Hemisphere summer from August 7 through 22, 2010, within the 23 wards that constitute Tokyo, Japan. Approval from the Juntendo University Ethics Committee was waived for this study. Eligible participants were Japanese pedestrians; outdoor workers and those wearing uniforms or formal attire were excluded, as were individuals of non-Japanese ethnicity (as identified by appearance and language). In order to obtain a representative

Author Affiliations:
Department of Dermatology,
Juntendo University Graduate
School of Medicine,
Tokyo, Japan.

Table 1. Number of Japanese Pedestrians Using Sun-Protective Items^a

No. of Items	No. (%) in Each Age Group							
	Females				Males			
	14-29 y (n=565)	30-60 y (n=524)	>60 y (n=125)	Total (n=1214)	14-29 y (n=490)	30-60 y (n=485)	>60 y (n=149)	Total (n=1124)
0	368 (65.1) ^b	184 (35.1)	19 (15.2)	571 (47.0)	378 (77.1)	353 (72.8)	54 (36.2) ^c	785 (69.8)
1	189 (33.5)	300 (57.3)	89 (71.2)	578 ^d (47.6)	105 (21.4)	120 (24.7)	77 (51.7)	302 (26.9)
≥2	8 (1.4)	40 (7.6)	17 (13.6)	65 ^d (5.4)	7 (1.4)	12 (2.5)	18 (12.1)	37 (3.3)

^aPercentages may not total 100 because of rounding.

^bStatistically significant ($P < .001$) for groups aged 14 to 29 years vs aged 30 to 60 years and aged 14 to 29 years vs older than 60 years.

^cStatistically significant ($P < .001$) for groups older than 60 years vs aged 30 to 60 years and older than 60 years vs aged 14 to 29 years.

^dStatistically significant ($P < .001$) compared with males.

Table 2. Different Types of Sun-Protective Items Used by Japanese Pedestrians^a

Item	No. (%) in Each Age Group							
	Females				Males			
	14-29 y (n=565)	30-60 y (n=524)	>60 y (n=125)	Total (n=1214)	14-29 y (n=490)	30-60 y (n=485)	>60 y (n=149)	Total (n=1124)
Parasol	104 (18.4)	240 (45.8)	57 (45.6)	401 (33.0) ^b	0	1 (0.2)	0	1 (0.09)
Hat	65 (11.5)	92 (17.6)	48 (38.4)	205 (16.9)	89 (18.2)	99 (20.4)	91 (61.1)	279 (24.8)
Sunglasses	35 (6.2)	31 (5.9)	13 (10.4)	79 (6.5)	30 (6.1)	44 (9.1)	22 (14.8)	96 (8.5)
Gloves/protective sleeves	1 (0.2)	17 (3.2)	5 (4.0)	23 (1.9)	0	0	0	0

^aEach individual may have a different item count.

^bStatistically significant ($P < .001$) compared with males.

sample of pedestrians, observations were undertaken at 5 locales in different wards (in the districts of Ginza, Asakusa, Shibuya, Shinjuku, and Ikebukuro) that are representative of the major shopping and recreational areas of Tokyo.

A precoded record sheet was used to document observations for each site, including site and data-gathering details (date, time, and address), details of subject individuals (sex and age category), and type of sun-protective item used (hat, parasol, sunglasses, protective sleeves, gloves, combinations of these, or none). Pedestrians were monitored for the use or lack of sun-protective items. Two individuals under a parasol were counted as 1 individual with 1 parasol. Data were collected during weekends between the hours of 11 AM and 2 PM until approximately 200 female and 200 male pedestrians were observed at each location. The age of participants was estimated, and each individual was categorized into 1 of 3 age groups: adolescents and young adults (aged 14-29 years), adults (aged 30-60 years), and senior citizens (older than 60 years). Observation was undertaken during predominantly sunny days, and official weather data from the Japan Meteorological Agency for the relevant day was documented, including temperature and estimated UV index.

Statistical analysis was performed using GraphPad Prism software, version 4 (GraphPad Software, Inc, La Jolla, California). Differences between the sexes and comparisons among age groups were analyzed by inputting values into contingency tables and performing the χ^2 test. $P < .05$ was considered to be significant.

RESULTS

During the observation period, the temperature ranged from 29.7°C (85.5°F) to 34.5°C (94.1°F) and the UV in-

dex ranged from 6 to 8. As shown in **Table 1**, a total of 2338 pedestrians were observed, including 1214 females and 1124 males, with 1055 of them (45.1%) judged to be aged 14 to 29 years, 1009 (43.2%) aged 30 to 60 years, and 274 (11.7%) older than 60 years.

A statistically significant difference was observed in the proportion of female compared with male pedestrians using 1 or more sun-protective items (53.0% vs 30.2%, $P < .001$) (Table 1). Parasols and hats were the most common sun-protective items for female (33.0%) and male (24.8%) pedestrians, respectively (**Table 2**). A significant sex difference was observed in the use of parasols ($P < .001$), but no statistical significance was observed in the use of hats ($P = .92$) or sunglasses ($P = .44$). Notably, the wearing of sunglasses was low in female (6.5%) and male (8.5%) pedestrians. A small proportion of the studied population used shade-creating protective items (a parasol or a hat) and sunglasses (2.9%). A small percentage of females (1.9%) wore gloves and/or protective sleeves.

When age groups were examined, it was noted that a significant proportion of adolescent girls and young women did not use any sun-protective items (65.1%); this was statistically significant ($P < .001$) compared with adult women (35.1%) and female senior citizens (15.2%) (Table 1). In the male subgroups, relatively high numbers of adolescent boys and young men (77.1%) and adult men (72.8%) did not use any sun-protective items; this was statistically significant ($P < .001$) compared with male senior citizens (36.2%).

The UV index for Tokyo (northern latitude of 35°41') can reach a maximum of 10 during summer.¹⁷ In this study, the UV index estimate for Tokyo during the midday hours corresponded to the high and very high exposure categories.¹⁸ In this setting, Japanese female pedestrians were more likely than their male counterparts to use 1 or more sun-protective items and used parasols as their primary protective item, sunglasses were not commonly worn by pedestrians, and a large proportion of adolescents and young adults did not use any sun-protective items.

The sex difference in sun-protective behavior is consistent with reports in the media and in the anthropological literature of the avoidance of tanning by Japanese women.¹⁹⁻²² Information in the medical literature is lacking in this regard; however, a survey of 379 Japanese dermatology outpatients highlighted a significantly greater use of sunscreen in females (57% vs 18%), as well as a greater likelihood of habitual sun exposure in males (31% vs 19%).²³ Of interest, a recent questionnaire-based study²⁴ conducted in northern China also demonstrated a significant sex difference in sun-protective practices, including a greater use of sunscreen (78% vs 28%) and parasols (65% vs 14%) by females and a larger percentage of males using no sun protection (16% vs 4%).

It has been documented that Asians have a cultural preference for a light complexion and avoid tanning^{19-22,24,25} and that Western acculturation of individuals of Asian descent was associated with increased sun-seeking behavior.²⁶ Unlike in the United States, Australia, or England, where public health campaigns promote sun-safety practices, no such programs exist in Japan, to our knowledge. Thus, the tendency of Japanese females to shield themselves from the sun may be related to cultural and/or cosmetic concerns rather than the specific desire to prevent skin cancer.²² In contrast to Western society, in which sun-seeking behavior is influenced by the perceived attractiveness of tanned skin,^{27,28} societal values in Japan may influence women to reduce harmful behavior with respect to sun exposure.

Specific observational studies regarding the wearing of sunglasses in public outdoor settings recorded that sunglasses were worn by more than one-third of observed subjects in Melbourne, Australia (36.2%),²⁹ and Honolulu, Hawaii (33.0%).³⁰ In a nonwhite (northern Chinese) population, 42.9% of male and 46.8% of female participants reported the use of sunglasses in a questionnaire-based survey.²⁴ Comparatively, low use of sunglasses by Japanese pedestrians was observed in this study (less than 10% in males and females), despite the high UV indices recorded during the study period. As mentioned herein, this finding may be consistent with aesthetic motivation for sun avoidance rather than motivation based on awareness of the dangers of solar radiation to the skin and the eyes. Furthermore, it is plausible that pedestrians who use shade-creating protective items may perceive sunglasses to be unnecessary, which may reflect the observed small proportion (2.9%) of pedestrians using shade-creating protective items and sunglasses. Although it is unknown whether shade-

creating protective items are as effective as sunglasses in the prevention of UV cataractogenesis, parasols and brimmed hats reduce sun exposure and modify the UV radiation dose received by the eyes.³¹ However, wrap-around sunglasses and those with side shields and broad temple arms provide the best protection geometrically compared with ordinary sunglasses and shade-creating protective items.^{31,32}

The advantage of an observational study to monitor sun-protective practices compared with self-report surveys is the direct observation of behavior that is not subject to response or recall bias.³³ However, limitations of this study include its estimation of the age of the participants, the possibility of inclusion of non-Japanese individuals, and an inability to assess other important methods of sun protection, including sunscreen use, type of clothing, and shade-seeking behavior. This study of the use of sun-protective items appears to be biased toward females, since parasols, gloves, and protective sleeves are considered to be traditionally feminine items according to societal norms and, thus, are not commonly used by males. However, it should be noted that participants not using sun-protective items were taken into account, the proportion of which were higher in males compared with females.

A questionnaire-based study would be useful to assess community awareness of the risks of UV radiation, particularly in adolescents and young adults, who exhibited low use of sun-protective items, and to examine the use of sun-protective clothing and sunscreen in this population. Because of the low use of sunglasses, a public education campaign may be warranted to increase awareness of UV-induced ocular damage.

Accepted for Publication: June 3, 2011.

Correspondence: William Ng, MBBS, PhD, Department of Dermatology, Juntendo University Graduate School of Medicine, 2-1-1 Hongo, Bunkyo-ku, Tokyo 113-8421, Japan (wng@juntendo.ac.jp).

Author Contributions: Dr Ng had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Ng. *Acquisition of data:* Ng. *Analysis and interpretation of data:* Ng and Ikeda. *Drafting of the manuscript:* Ng. *Critical revision of the manuscript for important intellectual content:* Ikeda. *Administrative, technical, and material support:* Ng. *Study supervision:* Ikeda. **Financial Disclosure:** None reported.

Additional Contributions: We thank Martin Mainster, FRCOphth, MD, PhD, and David Sliney, PhD, for their discussion of ocular photoprotection.

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